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**MCAS EL TORO, CALIFORNIA**

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**Installation Restoration  
Program**

**Report  
Interim Groundwater Treatment System  
Monthly Monitoring Reports - AUGUST**

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1990



**MCAS EL TORO**  
**INTERIM GROUNDWATER TREATMENT SYSTEM**  
**MONTHLY MONITORING REPORT**  
**AUGUST 1990**

MCAS EL TORO  
INTERIM GROUNDWATER TREATMENT SYSTEM  
MONTHLY MONITORING REPORT

AUGUST 1990

***BACKGROUND***

James M. Montgomery, Consulting Engineers, Inc. (JMM) is submitting its third of three additional monthly monitoring reports for the MCAS El Toro Interim Groundwater Treatment System as part of Contract No. N68711-85-C-5592, Modifications P00026 & P00027. JMM had previously submitted nine monthly reports covering the period from July 1989 to April 1990 as part of Modifications P00018 & P00019 to the aforementioned contract.

The system consists of three wells extracting groundwater from along the southwestern perimeter of the Base and pumping it to a granular activated carbon (GAC) treatment system near Building 319. The treated water is pumped into the golf course irrigation system. The interim groundwater treatment system has been in operation since June 15, 1989.

***ACTIVITIES COMPLETED THIS MONTH***

**Analytical Data**

- o Five samples were collected August 27, 1990 for analyses. The samples collected included: one sample for the influent to Unit 1 at the GAC Treatment System, one sample for the effluent of Unit 1, and one sample for the effluent of Unit 2 were collected. Matrix spike and duplicate samples were also obtained for QA/QC analyses.

***OPERATION DATA***

- o Flow meter readings were taken at all three wells, the GAC treatment and the golf course storage tank.
- o PS-4 was not operating due to an electrical outage in the area. Apparently there are some short circuit problems that has disabled the panelboard at Building 802 which powers PS-4. The power was subsequently restored and PS-4 was put into operation the first week in September.
- o The tetrahydrofuran that was analyzed in the influent to the GAC several months ago has not been detected since. This compound is found in PVC solvent cement and it is postulated that its source is a result of repair work that was performed on the supply line from PS-1 to the GAC Treatment Facility.

***MAINTENANCE DATA***

- o Conducted general housekeeping around all the sites.

## *DISCUSSION OF RESULTS*

The three wells pumped an average of seven gallons per minute to the GAC treatment system from the beginning of August until the end of August. Only during the first month of operation has the design flow of 30 gallons per minute been achieved. Approximately 3 million gallons of groundwater have been treated during the fourteen months of operation.

Table 1 provides a summary of the analytical results for samples taken before start up of the GAC treatment system and results of subsequent monthly monitoring samples. Table 2 provides a summary of the groundwater extracted from the three wells and treated at the GAC treatment facility. Figure 1 is a schematic flow diagram of the overall extraction and treatment system including sample locations.

After replacement of one of the GAC units, the volatile organics detected in the outlet of Unit 1 are chloroform (1.7 ppb) and Cis 1,2 Dichloroethene (1.3 ppb). The original design criteria allows up to five micrograms per liter of a contaminant before procedures for replacing a carbon unit is implemented. No contaminants were detected in the effluent being pumped to the golf course storage tank.

## *ACTIVITIES PLANNED FOR NEXT MONTH*

Unless a contract extension is negotiated, no activities are planned for the month of September 1990.

## *RECOMMENDATIONS*

The following is a list of items that are needed to help improve the operation of the Interim Groundwater Treatment System:

- o The layout for the GAC units should be revised to facilitate changeouts of spent GAC units. The current layout requires both GAC units to be moved during changeout. Both units could be located in front of the gate so that only the spent unit needs to be moved during changeout. The influent piping would also be redone to coordinate with the new layout. This recommendation is being made since the Interim Groundwater Treatment System is being proposed to remain in operation for at least another year.
- o The entire system should be evaluated for improvements (e.g. overflow containment, buried double wall supply line, telemetry from extraction wells, IRWD use of 8-inch reclaim line for treated wastewater effluent to golf course, etc.) that may be required to meet longer term use than was originally intended.

TABLE  
EL TORO INTERIM GROUNDWATER TREATMENT SYSTEM

SUMMARY OF ANALYTICAL RESULTS

| Location/Compound                              | Sample Date, Concentration, ppb (µg/l) |         |         |          |          |          |         |             |         |         |             |            |         |
|--|--|---------|---------|----------|----------|----------|---------|-------------|---------|---------|-------------|------------|---------|
|  | Before startup                         | 7/28/89 | 9/11/89 | 10/12/89 | 11/13/89 | 12/18/89 | 1/26/90 | 2/23/90 (a) | 3/27/90 | 4/26/90 | 6/28/90 (b) | 8/3/90 (c) | 8/27/90 |
| <b>PS-1</b>                                    |  |         |         |          |          |          |         |             |         |         |             |            |         |
| Chloroform                                     | NA                                     | NA      | NA      | NA       | NA       | NA       | NA      | NA          | NA      | NA      | NA          | ND         | NA      |
| PCE  |  |         |         |          |          |          |         |             |         |         |             | ND         |         |
| TCE  |  |         |         |          |          |          |         |             |         |         |             | ND         |         |
| Cis 1,2 Dichloroethene                         |  |         |         |          |          |          |         |             |         |         |             | ND         |         |
| <b>PS-3</b>                                    |  |         |         |          |          |          |         |             |         |         |             |            |         |
| Chloroform                                     | ND --> 12                              | 2.6     | NA      | NA       | NA       | NA       | NA      | NA          | NA      | NA      | NA          | ND         | NA      |
| PCE  | 24 --> 83                              | 76      |         |          |          |          |         |             |         |         |             | 46         |         |
| TCE  | 33 --> 70                              | 65      |         |          |          |          |         |             |         |         |             | 81         |         |
| Cis 1,2 Dichloroethene                         | ND --> 7.4                             | 5.8     |         |          |          |          |         |             |         |         |             | ND         |         |
| <b>PS-4</b>                                    |  |         |         |          |          |          |         |             |         |         |             |            |         |
| Chloroform                                     | ND --> 3.1                             | 2.4     | NA      | NA       | NA       | NA       | NA      | NA          | NA      | NA      | NA          | NA         | NA      |
| PCE  | 48 --> 59                              | 60      |         |          |          |          |         |             |         |         |             |            |         |
| TCE  | 78 --> 98                              | 70      |         |          |          |          |         |             |         |         |             |            |         |
| Cis 1,2 Dichloroethene                         | 10 --> 15                              | 8       |         |          |          |          |         |             |         |         |             |            |         |
| <b>GAC Inlet</b>                               |  |         |         |          |          |          |         |             |         |         |             |            |         |
| Chloroform                                     | NA                                     | 3       | 2.9     | 3        | ND       | 3.2      | 2.7     | 1.8         | ND      | ND      | ND          | ND         | ND      |
| PCE  |  | 100     | 58      | 69       | 68       | 54       | 58      | 56          | 47      | 49      | ND          | 39         | 25      |
| TCE  |  | 99      | 100     | 150      | 150      | 160      | 130     | 92          | 97      | 72      | 9           | 75         | 95      |
| Cis 1,2 Dichloroethene                         |  | 7.9     | 8.4     | 9.2      | 5        | 4.8      | 6.1     | 6.3         | 5.6     | 7.4     | ND          | ND         | ND      |
| 2-Butanone                                     |  | ND      | 25      | ND       | ND       | ND       | ND      | ND          | ND      | ND      | ND          | ND         | ND      |
| 1,1,2-Trichloroethane                          |  | ND      | ND      | ND       | ND       | ND       | 2.4     | 1.2         | ND      | ND      | ND          | ND         | ND      |
| Xylenes  |  | ND      | ND      | ND       | ND       | ND       | 2.2     | ND          | ND      | ND      | ND          | ND         | ND      |
| <b>Unit 1 Outlet</b>                           |  |         |         |          |          |          |         |             |         |         |             |            |         |
| Chloroform                                     | NA                                     | ND      | 0.2     | 0.6      | 1.4      | 1.7      | 2.9     | 0.8         | 0.7     | 1.0     | 0.7         | 1.6        | 1.7     |
| PCE  |  | 0.6     | ND      | ND       | ND       | ND       | ND      | ND          | ND      | ND      | ND          | ND         | ND      |
| TCE  |  | 0.2     | ND      | ND       | ND       | ND       | 2.1     | ND          | ND      | ND      | ND          | ND         | ND      |
| Cis 1,2 Dichloroethene                         |  | ND      | ND      | 1.3      | 1.4      | ND       | 5.8     | ND          | ND      | ND      | ND          | 0.5        | 1.3     |
| 1,1-Dichloroethane                             |  | ND      | ND      | ND       | 0.4      | 0.4      | 0.6     | ND          | ND      | ND      | ND          | ND         | ND      |
| Trans-1,2-Dichloroethene                       |  | ND      | ND      | ND       | ND       | 1.7      | 0.2     | ND          | ND      | ND      | ND          | ND         | ND      |
| 1,1-Dichloroethene                             |  | ND      | ND      | ND       | ND       | ND       | 0.4     | ND          | ND      | ND      | ND          | ND         | ND      |
| 1,1,2-Trichloroethane                          |  | ND      | ND      | ND       | ND       | ND       | 1.1     | ND          | ND      | ND      | ND          | ND         | ND      |
| <b>GAC Outlet</b>                              |  |         |         |          |          |          |         |             |         |         |             |            |         |
| Chloroform                                     | NA                                     | ND      | ND      | ND       | ND       | ND       | 0.2     | ND          | ND      | ND      | ND          | ND         | ND      |
| PCE  |  | ND      | ND      | ND       | ND       | ND       | ND      | ND          | ND      | ND      | ND          | ND         | ND      |
| TCE  |  | ND      | ND      | ND       | ND       | ND       | ND      | ND          | ND      | ND      | ND          | ND         | ND      |
| Cis 1,2 Dichloroethene                         |  | ND      | ND      | ND       | ND       | ND       | ND      | ND          | ND      | ND      | ND          | ND         | ND      |
| 1,1-Dichloroethane                             |  | ND      | ND      | ND       | ND       | ND       | 0.1     | ND          | ND      | ND      | ND          | ND         | ND      |
| <b>Groundwater Treated each month, gallons</b> | NA                                     | 205,790 | 459,085 | 263,550  | 352,046  | 252,345  | 364,538 | 299,365     | 150,296 | 130,025 | 69,392      | 171,255    | 245,598 |

Legend: NA- No analysis  
 ND- Not detected  
 (a) - Unit 1 was replaced with a new unit  
 (b) - PS-1 was the only extraction well in operation at the time of the sample.  
 (c) - The power supply for PS-4 was disconnected so a sample could not be collected.

TABLE 2

## EL TORO GROUNDWATER TREATMENT SYSTEM

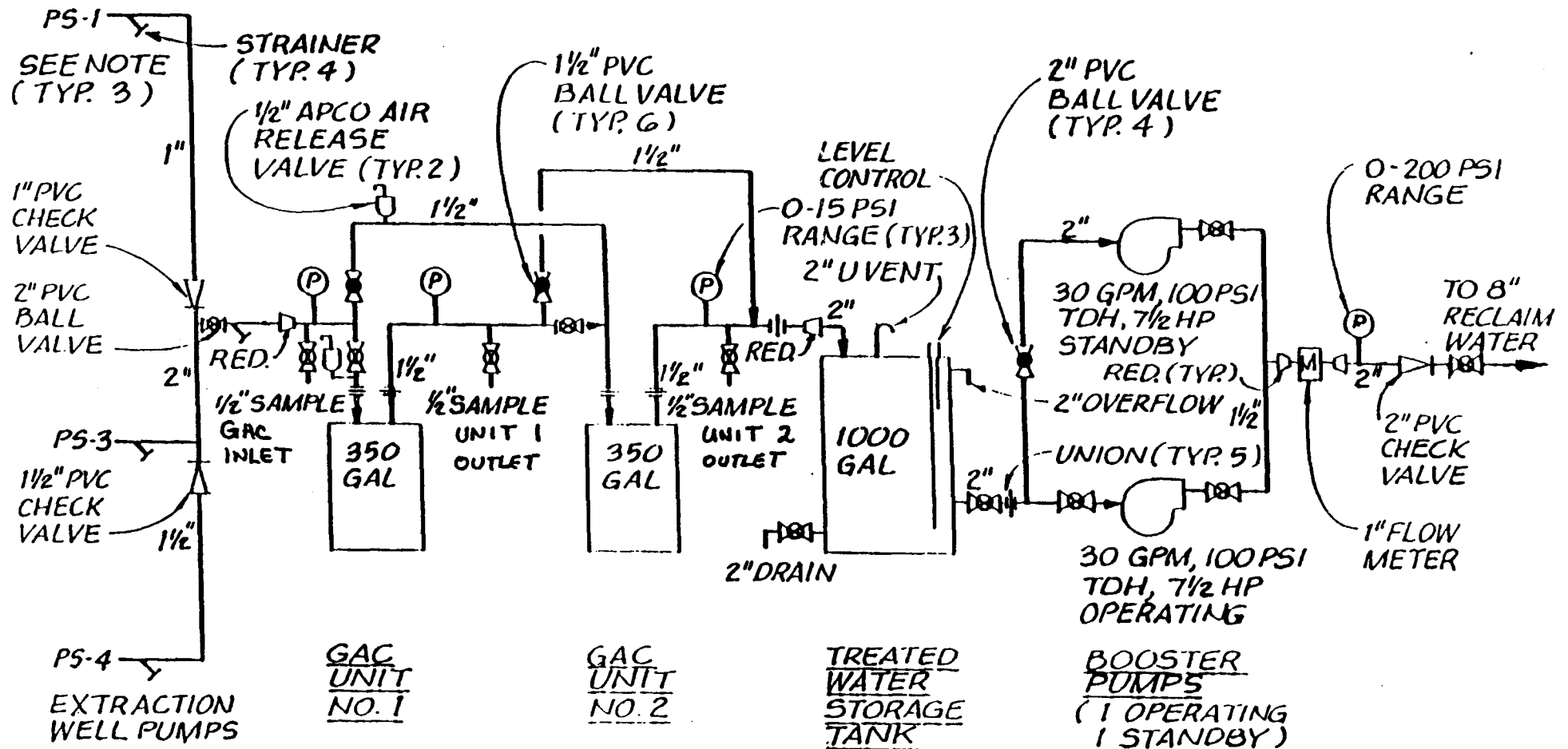
## SUMMARY OF FLOW RATES

|  | July<br>7/7/82 | July<br>7/29/82 | September<br>9/11/82 | October<br>10/13/82 | November<br>11/13/82 | December<br>12/18/82 | January<br>1/26/90 | February<br>3/2/90 | March<br>3/27/90 | April<br>4/26/90 | June<br>6/28/90 | July (a)<br>8/3/90 | August<br>8/27/90 | 1989/1990<br>Total |
|--|----------------|-----------------|----------------------|---------------------|----------------------|----------------------|--------------------|--------------------|------------------|------------------|-----------------|--------------------|-------------------|--------------------|
| <b>PS-1:</b>   |                |                 |                      |                     |                      |                      |                    |                    |                  |                  |                 |                    |                   |                    |
| Meter reading, gal   | NA             | 300             | 569                  | 8,100               | 8,100                | 8,100                | 8,440              | 16,150             | 17,890           | 39,220           | 58,770          | 58,930             | 72,200            |                    |
| Gallons pumped   |                | 300             | 269                  | 7,531               | 0                    | 0                    | 340                | 7,710              | 1,740            | 21,330           | 19,550          | 160                | 13,270            | 72,200             |
| Days   | 0              | 22              | 44                   | 32                  | 31                   | 35                   | 39                 | 35                 | 25               | 30               | 63              | 36                 | 24                | 416                |
| Ave flow, gpm  | 0              | 0.01            | 0.0044               | 0.16                | 0.00                 | 0.00                 | 0.01               | 0.15               | 0.05             | 0.49             | 0.22            | 0.00               | 0.38              | 0.12               |
| <b>PS-3:</b>   |                |                 |                      |                     |                      |                      |                    |                    |                  |                  |                 |                    |                   |                    |
| Meter reading, gal   | 6,470          | 22,580          | 235,590              | 368,870             | 550,750              | 731,730              | 924,700            | 1,071,920          | 1,071,920        | 1,105,810        | 1,105,990       | 1,125,010          | 1,356,580         |                    |
| Gallons pumped   | 6,470          | 16,110          | 213,010              | 133,280             | 181,880              | 180,980              | 192,970            | 147,220            | 0                | 33,890           | 180             | 19,020             | 231,570           | 1,356,580          |
| Days   | 0              | 22              | 44                   | 32                  | 31                   | 35                   | 39                 | 35                 | 25               | 30               | 63              | 36                 | 24                | 416                |
| Ave flow, gpm  | 35.94          | 0.51            | 3.36                 | 2.89                | 4.07                 | 3.59                 | 3.44               | 2.92               | 0.00             | 0.78             | 0.00            | 0.37               | 6.70              | 2.26               |
| <b>PS-4:</b>   |                |                 |                      |                     |                      |                      |                    |                    |                  |                  |                 |                    |                   |                    |
| Meter reading, gal   | 5,930          | 189,730         | 426,500              | 569,870             | 732,470              | 798,850              | 1,019,330          | 1,162,480          | 1,300,120        | 1,384,180        | 1,435,630       | 1,435,630          | 1,435,630         |                    |
| Gallons pumped   | 1,860          | 183,800         | 236,770              | 143,370             | 162,600              | 66,380               | 220,480            | 143,150            | 137,640          | 84,060           | 51,450          | 0                  | 0                 | 1,435,630          |
| Days   | 0              | 22              | 44                   | 32                  | 31                   | 35                   | 39                 | 35                 | 25               | 30               | 63              | 36                 | 24                | 416                |
| Ave flow, gpm  | 10.33          | 5.80            | 3.74                 | 3.11                | 3.64                 | 1.32                 | 3.93               | 2.84               | 3.82             | 1.95             | 0.57            | 0.00               | 0.00              | 2.40               |
| <b>GAC:</b>  |                |                 |                      |                     |                      |                      |                    |                    |                  |                  |                 |                    |                   |                    |
| Meter reading, cuft  | 1,301          | 28,813          | 90,188               | 125,422             | 172,487              | 206,223              | 254,958            | 294,980            | 315,073          | 332,456          | 341,733         | 364,628            | 397,462           |                    |
| Gallons pumped   | 4,555          | 205,790         | 459,085              | 263,550             | 352,046              | 252,345              | 364,538            | 299,365            | 150,296          | 130,025          | 69,392          | 171,255            | 245,598           | 2,973,016          |
| Days   | 0.131          | 22              | 44                   | 32                  | 31                   | 35                   | 39                 | 35                 | 25               | 30               | 63              | 36                 | 24                | 416                |
| Ave flow, gpm  | 25.31          | 6.50            | 7.25                 | 5.72                | 7.89                 | 5.01                 | 6.49               | 5.94               | 4.17             | 3.01             | 0.76            | 3.30               | 7.11              | 4.96               |
| <b>Golf Course Storage Tank</b>  |                |                 |                      |                     |                      |                      |                    |                    |                  |                  |                 |                    |                   |                    |
| Meter reading, cuft  | 39,903,500     | 41,678,000      | 44,641,300           | 45,982,500          | 46,757,000           | 47,813,700           | 48,438,600         | 49,143,200         | 49,777,600       | 50,482,000       | 53,562,800      | 56,734,800         | 58,338,100        |                    |
| Gallons pumped   |                | 13,273,260      | 22,165,484           | 10,032,176          | 5,793,260            | 7,904,116            | 4,674,252          | 5,270,408          | 4,745,312        | 5,268,912        | 23,044,384      | 23,726,560         | 11,992,684        | 137,890,808        |
| Days   |                | 22              | 44                   | 32                  | 31                   | 35                   | 39                 | 35                 | 25               | 30               | 63              | 36                 | 24                | 416                |
| Ave flow, gpm  | 0.00           | 419             | 350                  | 218                 | 130                  | 157                  | 83                 | 105                | 132              | 122              | 254             | 458                | 347               | 230                |
| <b>Treated Groundwater as of a %<br/>of Golf Course Irrigation Water</b> |                | 1.6%            | 2.1%                 | 2.6%                | 6.1%                 | 3.2%                 | 7.8%               | 5.7%               | 3.2%             | 2.5%             | 0.3%            | 0.7%               | 2.0%              | 2.2%               |

(a) Flow meters at PS-1 &amp; PS-4 were not working

EL TOKU MLHS  
INTERIM GROUNDWATER  
TREATMENT SYSTEM  
SCHEMATIC FLOW DIAGRAM

FIGURE 1



**ANALYTICAL RESULTS**

MONTGOMERY LABORATORIES  
a division of James M. Montgomery, Consulting Engineers, Inc.  
555 East Walnut Street, Pasadena, California 91101  
(818) 796-9141 / (213) 681-4255 Telex 67-5420

Report of GC/MS Analysis for  
VOLATILE ORGANICS  
in Water

Navy (MCAS-El Toro)/JMM-WCK  
501 Lennon Lane  
Suite 200  
Walnut Creek, CA 94598  
Attn: Rick Wilson

Job#: 226.0380  
PO#:   
Workorder#: W30654  
Report#: R46871  
Phone #: 415-933-2250

Date Sampled: 8/27/90  
Date Analyzed: 9/4/90

Date Received: 8/27/90

Lab Number: K86164  
Sample I.D.: GAC 1

| Compound | Concentration<br>(micrograms/liter) | Detection Limit<br>(micrograms/liter) |
|----------|-------------------------------------|---------------------------------------|
|----------|-------------------------------------|---------------------------------------|

VOLATILE PRIORITY POLLUTANTS:

|                           |    |      |
|---------------------------|----|------|
| Acrolein                  | ND | 25   |
| Acrylonitrile             | ND | 25   |
| Benzene                   | ND | 12.5 |
| Bromoform                 | ND | 12.5 |
| Carbon Tetrachloride      | ND | 12.5 |
| Chlorobenzene             | ND | 12.5 |
| Dibromochloromethane      | ND | 12.5 |
| Chloroethane              | ND | 25   |
| 2-Chloroethylvinylether   | ND | 25   |
| Chloroform                | ND | 12.5 |
| Dichlorobromomethane      | ND | 12.5 |
| 1,1-Dichloroethane        | ND | 12.5 |
| 1,2-Dichloroethane        | ND | 12.5 |
| 1,1-Dichloroethene        | ND | 12.5 |
| 1,2-Dichloropropane       | ND | 12.5 |
| Ethylbenzene              | ND | 12.5 |
| Methyl Bromide            | ND | 25   |
| Methyl Chloride           | ND | 25   |
| Methylene Chloride        | ND | 125  |
| 1,1,2,2-Tetrachloroethane | ND | 12.5 |

ND: Not Detected

NA: Not Analyzed

HSL compounds are tentative quantitations based on single point calibration.

Approved by 

APPROVED

SEP 07 1990

QC OFFICER

Report of GC/MS Analysis for  
VOLATILE ORGANICS  
in Water

Lab Number: K86164  
Sample I.D.: GAC 1

| Compound | Concentration<br>(micrograms/liter) | Detection Limit<br>(micrograms/liter) |
|----------|-------------------------------------|---------------------------------------|
|----------|-------------------------------------|---------------------------------------|

VOLATILE PRIORITY POLLUTANTS (continued):

|                           |    |      |
|---------------------------|----|------|
| Tetrachloroethene         | 25 | 12.5 |
| Toluene                   | ND | 12.5 |
| 1,1,1-Trichloroethane     | ND | 12.5 |
| 1,1,2-Trichloroethane     | ND | 12.5 |
| Trichloroethene           | 95 | 12.5 |
| Vinyl Chloride            | ND | 25   |
| trans-1,3-Dichloropropene | ND | 12.5 |
| cis-1,3-Dichloropropene   | ND | 12.5 |
| trans-1,2-Dichloroethene  | ND | 12.5 |
| cis-1,2-Dichloroethene    | ND | 12.5 |
| Trichlorofluoromethane    | ND | 25   |
| m,p-Xylenes               | ND | 12.5 |
| 1,2-Dichlorobenzene       | ND | 12.5 |
| 1,3-Dichlorobenzene       | ND | 12.5 |
| 1,4-Dichlorobenzene       | ND | 12.5 |

HAZARDOUS SUBSTANCES COMPOUNDS:

|                      |    |      |
|----------------------|----|------|
| Acetone              | ND | 250  |
| 2-Butanone           | ND | 25   |
| Carbon disulfide     | ND | 12.5 |
| 2-Hexanone           | ND | 25   |
| 4-Methyl-2-Pentanone | ND | 25   |
| Styrene              | ND | 12.5 |
| Tetrahydrofuran      | ND | 250  |
| Vinyl Acetate        | ND | 125  |
| o-Xylene             | ND | 12.5 |

ND: Not Detected

NA: Not Analyzed

HSL compounds are tentative quantitations based on single point calibration.

Report of GC/MS Analysis for  
VOLATILE ORGANICS  
in Water

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Lab Number: K86164  
Sample I.D.: GAC 1

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| Compound | Recovery<br>( % ) | QC Limits<br>( % ) |
|----------|-------------------|--------------------|
|----------|-------------------|--------------------|

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SURROGATE:

|                       |     |        |
|-----------------------|-----|--------|
| 4-Bromofluorobenzene  | 106 | 86-115 |
| 1,2-Dichloroethane-d4 | 99  | 76-114 |
| Toluene-d8            | 96  | 88-110 |

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ND: Not Detected

NA: Not Analyzed

HSL compounds are tentative quantitations based on single point calibration.

MONTGOMERY LABORATORIES  
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555 East Walnut Street, Pasadena, California 91101  
(818) 796-9141 / (213) 681-4255 Telex 67-5420

Report of GC/MS Analysis for  
VOLATILE ORGANICS  
in Water

Navy (MCAS-El Toro) / JMM-WCK  
501 Lennon Lane  
Suite 200  
Walnut Creek, CA 94598  
Attn: Rick Wilson

Job#: 226.0380  
PO#:   
Workorder#: W30654  
Report#: R46872  
Phone #: 415-933-2250

Date Sampled: 8/27/90  
Date Analyzed: 9/5/90

Date Received: 8/27/90

Lab Number: K86165  
Sample I.D.: GAC 1 DUP

| Compound | Concentration<br>(micrograms/liter) | Detection Limit<br>(micrograms/liter) |
|----------|-------------------------------------|---------------------------------------|
|----------|-------------------------------------|---------------------------------------|

VOLATILE PRIORITY POLLUTANTS:

|                           |    |      |
|---------------------------|----|------|
| Acrolein                  | ND | 25   |
| Acrylonitrile             | ND | 25   |
| Benzene                   | ND | 12.5 |
| Bromoform                 | ND | 12.5 |
| Carbon Tetrachloride      | ND | 12.5 |
| Chlorobenzene             | ND | 12.5 |
| Dibromochloromethane      | ND | 12.5 |
| Chloroethane              | ND | 25   |
| 2-Chloroethylvinylether   | ND | 25   |
| Chloroform                | ND | 12.5 |
| Dichlorobromomethane      | ND | 12.5 |
| 1,1-Dichloroethane        | ND | 12.5 |
| 1,2-Dichloroethane        | ND | 12.5 |
| 1,1-Dichloroethene        | ND | 12.5 |
| 1,2-Dichloropropane       | ND | 12.5 |
| Ethylbenzene              | ND | 12.5 |
| Methyl Bromide            | ND | 25   |
| Methyl Chloride           | ND | 25   |
| Methylene Chloride        | ND | 125  |
| 1,1,2,2-Tetrachloroethane | ND | 12.5 |

ND: Not Detected

NA: Not Analyzed

HSL compounds are tentative quantitations based on single point calibration.

Approved by 

APPROVED

SEP 18 1990

QC OFFICER

Report of GC/MS Analysis for  
VOLATILE ORGANICS  
in Water

Lab Number:  
Sample I.D.:

K86165  
GAC 1 DUP

| Compound | Concentration<br>(micrograms/liter) | Detection Limit<br>(micrograms/liter) |
|----------|-------------------------------------|---------------------------------------|
|----------|-------------------------------------|---------------------------------------|

VOLATILE PRIORITY POLLUTANTS (continued):

|                           |     |      |
|---------------------------|-----|------|
| Tetrachloroethene         | 50  | 12.5 |
| Toluene                   | ND  | 12.5 |
| 1,1,1-Trichloroethane     | ND  | 12.5 |
| 1,1,2-Trichloroethane     | ND  | 12.5 |
| Trichloroethene           | 140 | 12.5 |
| Vinyl Chloride            | ND  | 25   |
| trans-1,3-Dichloropropene | ND  | 12.5 |
| cis-1,3-Dichloropropene   | ND  | 12.5 |
| trans-1,2-Dichloroethene  | ND  | 12.5 |
| cis-1,2-Dichloroethene    | ND  | 12.5 |
| Trichlorofluoromethane    | ND  | 25   |
| m,p-Xylenes               | ND  | 12.5 |
| 1,2-Dichlorobenzene       | ND  | 12.5 |
| 1,3-Dichlorobenzene       | ND  | 12.5 |
| 1,4-Dichlorobenzene       | ND  | 12.5 |

HAZARDOUS SUBSTANCES COMPOUNDS:

|                      |    |      |
|----------------------|----|------|
| Acetone              | ND | 250  |
| 2-Butanone           | ND | 25   |
| Carbon disulfide     | ND | 12.5 |
| 2-Hexanone           | ND | 25   |
| 4-Methyl-2-Pentanone | ND | 25   |
| Styrene              | ND | 12.5 |
| Tetrahydrofuran      | ND | 250  |
| Vinyl Acetate        | ND | 125  |
| o-Xylene             | ND | 12.5 |

ND: Not Detected

NA: Not Analyzed

HSL compounds are tentative quantitations based on single point calibration.

Report of GC/MS Analysis for  
VOLATILE ORGANICS  
in Water

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Lab Number: K86165  
Sample I.D.: GAC 1 DUP

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| Compound              | Recovery<br>( % ) | QC Limits<br>( % ) |
|-----------------------|-------------------|--------------------|
| <hr/>                 |                   |                    |
| SURROGATE:            |                   |                    |
| 4-Bromofluorobenzene  | 113               | 86-115             |
| 1,2-Dichloroethane-d4 | 98                | 76-114             |
| Toluene-d8            | 110               | 88-110             |

---

ND: Not Detected

NA: Not Analyzed

HSL compounds are tentative quantitations based on single point calibration.

MONTGOMERY LABORATORIES  
a division of James M. Montgomery, Consulting Engineers, Inc.  
555 East Walnut Street, Pasadena, California 91101  
(818) 796-9141 / (213) 681-4255 Telex 67-5420

Report of GC/MS Analysis for  
VOLATILE ORGANICS  
in Water

Navy (MCAS-El Toro) / JMM-WCK  
501 Lennon Lane  
Suite 200  
Walnut Creek, CA 94598  
Attn: Rick Wilson

Job#: 226.0380  
PO#:   
Workorder#: W30654  
Report#: R46873  
Phone #: 415-933-2250

Date Sampled: 8/27/90  
Date Analyzed: 9/5/90

Date Received: 8/27/90

Lab Number: K86166  
Sample I.D.: GAC 2

| Compound | Concentration<br>(micrograms/liter) | Detection Limit<br>(micrograms/liter) |
|----------|-------------------------------------|---------------------------------------|
|----------|-------------------------------------|---------------------------------------|

VOLATILE PRIORITY POLLUTANTS:

|                           |     |      |
|---------------------------|-----|------|
| Acrolein                  | ND  | 1.0  |
| Acrylonitrile             | ND  | 1.0  |
| Benzene                   | ND  | 0.50 |
| Bromoform                 | ND  | 0.50 |
| Carbon Tetrachloride      | ND  | 0.50 |
| Chlorobenzene             | ND  | 0.50 |
| Dibromochloromethane      | ND  | 0.50 |
| Chloroethane              | ND  | 1.0  |
| 2-Chloroethylvinylether   | ND  | 1.0  |
| Chloroform                | 1.7 | 0.50 |
| Dichlorobromomethane      | ND  | 0.50 |
| 1,1-Dichloroethane        | ND  | 0.50 |
| 1,2-Dichloroethane        | ND  | 0.50 |
| 1,1-Dichloroethene        | ND  | 0.50 |
| 1,2-Dichloropropane       | ND  | 0.50 |
| Ethylbenzene              | ND  | 0.50 |
| Methyl Bromide            | ND  | 1.0  |
| Methyl Chloride           | ND  | 1.0  |
| Methylene Chloride        | ND  | 5.0  |
| 1,1,2,2-Tetrachloroethane | ND  | 0.50 |

ND: Not Detected

NA: Not Analyzed

HSL compounds are tentative quantitations based on single point calibration.

Approved by 

APPENDIX

SEP 10 1990

QC OFFICER

Report of GC/MS Analysis for  
VOLATILE ORGANICS  
in Water

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Lab Number: K86166  
Sample I.D.: GAC 2

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| Compound | Concentration<br>(micrograms/liter) | Detection Limit<br>(micrograms/liter) |
|----------|-------------------------------------|---------------------------------------|
|----------|-------------------------------------|---------------------------------------|

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VOLATILE PRIORITY POLLUTANTS (continued):

|                           |     |      |
|---------------------------|-----|------|
| Tetrachloroethene         | ND  | 0.50 |
| Toluene                   | ND  | 0.50 |
| 1,1,1-Trichloroethane     | ND  | 0.50 |
| 1,1,2-Trichloroethane     | ND  | 0.50 |
| Trichloroethene           | ND  | 0.50 |
| Vinyl Chloride            | ND  | 1.0  |
| trans-1,3-Dichloropropene | ND  | 0.50 |
| cis-1,3-Dichloropropene   | ND  | 0.50 |
| trans-1,2-Dichloroethene  | ND  | 0.50 |
| cis-1,2-Dichloroethene    | 1.3 | 0.50 |
| Trichlorofluoromethane    | ND  | 1.0  |
| m,p-Xylenes               | ND  | 0.50 |
| 1,2-Dichlorobenzene       | ND  | 0.50 |
| 1,3-Dichlorobenzene       | ND  | 0.50 |
| 1,4-Dichlorobenzene       | ND  | 0.50 |

HAZARDOUS SUBSTANCES COMPOUNDS:

|                      |    |      |
|----------------------|----|------|
| Acetone              | ND | 10   |
| 2-Butanone           | ND | 1.0  |
| Carbon disulfide     | ND | 0.50 |
| 2-Hexanone           | ND | 1.0  |
| 4-Methyl-2-Pentanone | ND | 1.0  |
| Styrene              | ND | 0.50 |
| Tetrahydrofuran      | ND | 10   |
| Vinyl Acetate        | ND | 5.0  |
| o-Xylene             | ND | 0.50 |

---

ND: Not Detected

NA: Not Analyzed

HSL compounds are tentative quantitations based on single point calibration.

Report of GC/MS Analysis for  
VOLATILE ORGANICS  
in Water

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|              |        |
|--------------|--------|
| Lab Number:  | K86166 |
| Sample I.D.: | GAC 2  |

---

| Compound | Recovery<br>( % ) | QC Limits<br>( % ) |
|----------|-------------------|--------------------|
|----------|-------------------|--------------------|

---

SURROGATE:

|                       |     |        |
|-----------------------|-----|--------|
| 4-Bromofluorobenzene  | 101 | 86-115 |
| 1,2-Dichloroethane-d4 | 99  | 76-114 |
| Toluene-d8            | 91  | 88-110 |

---

ND: Not Detected

NA: Not Analyzed

HSL compounds are tentative quantitations based on single point calibration.

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555 East Walnut Street, Pasadena, California 91101  
(818) 796-9141 / (213) 681-4255 Telex 67-5420

Report of GC/MS Analysis for  
VOLATILE ORGANICS  
in Water

Navy (MCAS-El Toro) / JMM-WCK  
501 Lennon Lane  
Suite 200  
Walnut Creek, CA 94598  
Attn: Rick Wilson

Job#: 226.0380  
PO#:   
Workorder#: W30654  
Report#: R46874  
Phone #: 415-933-2250

Date Sampled: 8/27/90  
Date Analyzed: 9/5/90

Date Received: 8/27/90

Lab Number: K86167  
Sample I.D.: GAC 3

| Compound | Concentration<br>(micrograms/liter) | Detection Limit<br>(micrograms/liter) |
|----------|-------------------------------------|---------------------------------------|
|----------|-------------------------------------|---------------------------------------|

VOLATILE PRIORITY POLLUTANTS:

|                           |    |      |
|---------------------------|----|------|
| Acrolein                  | ND | 1.0  |
| Acrylonitrile             | ND | 1.0  |
| Benzene                   | ND | 0.50 |
| Bromoform                 | ND | 0.50 |
| Carbon Tetrachloride      | ND | 0.50 |
| Chlorobenzene             | ND | 0.50 |
| Dibromochloromethane      | ND | 0.50 |
| Chloroethane              | ND | 1.0  |
| 2-Chloroethylvinylether   | ND | 1.0  |
| Chloroform                | ND | 0.50 |
| Dichlorobromomethane      | ND | 0.50 |
| 1,1-Dichloroethane        | ND | 0.50 |
| 1,2-Dichloroethane        | ND | 0.50 |
| 1,1-Dichloroethene        | ND | 0.50 |
| 1,2-Dichloropropane       | ND | 0.50 |
| Ethylbenzene              | ND | 0.50 |
| Methyl Bromide            | ND | 1.0  |
| Methyl Chloride           | ND | 1.0  |
| Methylene Chloride        | ND | 5.0  |
| 1,1,2,2-Tetrachloroethane | ND | 0.50 |

ND: Not Detected

NA: Not Analyzed

HSL compounds are tentative quantitations based on single point calibration.

Approved by 

APPROVED  
SEP 18 1990  
QC OFFICER

Report of GC/MS Analysis for  
VOLATILE ORGANICS  
in Water

Lab Number: K86167  
Sample I.D.: GAC 3

| Compound | Concentration<br>(micrograms/liter) | Detection Limit<br>(micrograms/liter) |
|----------|-------------------------------------|---------------------------------------|
|----------|-------------------------------------|---------------------------------------|

VOLATILE PRIORITY POLLUTANTS (continued):

|                           |    |      |
|---------------------------|----|------|
| Tetrachloroethene         | ND | 0.50 |
| Toluene                   | ND | 0.50 |
| 1,1,1-Trichloroethane     | ND | 0.50 |
| 1,1,2-Trichloroethane     | ND | 0.50 |
| Trichloroethene           | ND | 0.50 |
| Vinyl Chloride            | ND | 1.0  |
| trans-1,3-Dichloropropene | ND | 0.50 |
| cis-1,3-Dichloropropene   | ND | 0.50 |
| trans-1,2-Dichloroethene  | ND | 0.50 |
| cis-1,2-Dichloroethene    | ND | 0.50 |
| Trichlorofluoromethane    | ND | 1.0  |
| m,p-Xylenes               | ND | 0.50 |
| 1,2-Dichlorobenzene       | ND | 0.50 |
| 1,3-Dichlorobenzene       | ND | 0.50 |
| 1,4-Dichlorobenzene       | ND | 0.50 |

HAZARDOUS SUBSTANCES COMPOUNDS:

|                      |    |      |
|----------------------|----|------|
| Acetone              | ND | 10   |
| 2-Butanone           | ND | 1.0  |
| Carbon disulfide     | ND | 0.50 |
| 2-Hexanone           | ND | 1.0  |
| 4-Methyl-2-Pentanone | ND | 1.0  |
| Styrene              | ND | 0.50 |
| Tetrahydrofuran      | ND | 10   |
| Vinyl Acetate        | ND | 5.0  |
| o-Xylene             | ND | 0.50 |

ND: Not Detected

NA: Not Analyzed

HSL compounds are tentative quantitations based on single point calibration.

Report of GC/MS Analysis for  
VOLATILE ORGANICS  
in Water

---

Lab Number: K86167  
Sample I.D.: GAC 3

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| Compound | Recovery<br>( % ) | QC Limits<br>( % ) |
|----------|-------------------|--------------------|
|----------|-------------------|--------------------|

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SURROGATE:

|                       |     |        |
|-----------------------|-----|--------|
| 4-Bromofluorobenzene  | 101 | 86-115 |
| 1,2-Dichloroethane-d4 | 97  | 76-114 |
| Toluene-d8            | 95  | 88-110 |

---

ND: Not Detected

NA: Not Analyzed

HSL compounds are tentative quantitations based on single point calibration.

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555 East Walnut Street, Pasadena, California 91101  
(818) 796-9141 / (213) 681-4255 Telex 67-5420

Report of GC/MS Analysis for  
VOLATILE ORGANICS  
in Water

Navy(MCAS-El Toro)/JMM-WCK  
501 Lennon Lane  
Suite 200  
Walnut Creek, CA 94598  
Attn: Rick Wilson

Job#: 226.0380  
PO#:   
Workorder#: W30654  
Report#: R46875  
Phone #: 415-933-2250

Date Sampled: 8/27/90  
Date Analyzed: 9/5/90

Date Received: 8/27/90

Lab Number: K86168  
Sample I.D.: GAC 3 SPIKE

| Compound | % Recovery |
|----------|------------|
|----------|------------|

VOLATILE PRIORITY POLLUTANTS:

|                    |    |
|--------------------|----|
| Benzene            | 72 |
| Chlorobenzene      | 75 |
| Chloroform         | 82 |
| 1,1-Dichloroethene | 75 |
| Toluene            | 80 |
| Trichloroethene    | 92 |

Approved by 

APPROVED

SEP 07 1990

QC OFFICER

Report of GC/MS Analysis for  
VOLATILE ORGANICS  
in Water

Lab Number:  
Sample I.D.:

K86168  
GAC 3 SPIKE

| Compound              | Recovery<br>( % ) | QC Limits<br>( % ) |
|-----------------------|-------------------|--------------------|
| SURROGATE:            |                   |                    |
| 4-Bromofluorobenzene  | 97                | 86-115             |
| 1,2-Dichloroethane-d4 | 96                | 76-114             |
| Toluene-d8            | 93                | 88-110             |

Navy(MCAS-E1 Toro)/JMM-WCK  
501 Lennon Lane  
Suite 200  
Walnut Creek, CA 94598  
Attn: Rick Wilson

Job#: 226.0380  
PO#:   
Workorder#: W30654  
Report#: R46876  
Phone #: 415-933-2250

Date Sampled: 8/27/90  
Date Analyzed: 9/4/90

Date Received: 8/27/90

Lab Number:  
Sample I.D.:

K86169  
TRAVEL BLANK 8/20/90

| Compound | Concentration<br>(micrograms/liter) | Detection Limit<br>(micrograms/liter) |
|----------|-------------------------------------|---------------------------------------|
|----------|-------------------------------------|---------------------------------------|

|                           |    |      |
|---------------------------|----|------|
| Acrolein                  | ND | 1.0  |
| Acrylonitrile             | ND | 1.0  |
| Benzene                   | ND | 0.50 |
| Bromoform                 | ND | 0.50 |
| Carbon Tetrachloride      | ND | 0.50 |
| Chlorobenzene             | ND | 0.50 |
| Dibromochloromethane      | ND | 0.50 |
| Chloroethane              | ND | 1.0  |
| 2-Chloroethylvinylether   | ND | 1.0  |
| Chloroform                | ND | 0.50 |
| Dichlorobromomethane      | ND | 0.50 |
| 1,1-Dichloroethane        | ND | 0.50 |
| 1,2-Dichloroethane        | ND | 0.50 |
| 1,1-Dichloroethene        | ND | 0.50 |
| 1,2-Dichloropropane       | ND | 0.50 |
| Ethylbenzene              | ND | 0.50 |
| Methyl Bromide            | ND | 1.0  |
| Methyl Chloride           | ND | 1.0  |
| Methylene Chloride        | ND | 5.0  |
| 1,1,2,2-Tetrachloroethane | ND | 0.50 |

ND: Not Detected

NA: Not Analyzed

HSL compounds are tentative quantitations based on single point calibration.

Approved by

SEP 07 1955  
QC OFFICER

Report of GC/MS Analysis for  
VOLATILE ORGANICS  
in Water

Lab Number:  
Sample I.D.:

K86169  
TRAVEL BLANK 8/20/90

| Compound | Concentration<br>(micrograms/liter) | Detection Limit<br>(micrograms/liter) |
|----------|-------------------------------------|---------------------------------------|
|----------|-------------------------------------|---------------------------------------|

VOLATILE PRIORITY POLLUTANTS (continued):

|                           |    |      |
|---------------------------|----|------|
| Tetrachloroethene         | ND | 0.50 |
| Toluene                   | ND | 0.50 |
| 1,1,1-Trichloroethane     | ND | 0.50 |
| 1,1,2-Trichloroethane     | ND | 0.50 |
| Trichloroethene           | ND | 0.50 |
| Vinyl Chloride            | ND | 1.0  |
| trans-1,3-Dichloropropene | ND | 0.50 |
| cis-1,3-Dichloropropene   | ND | 0.50 |
| trans-1,2-Dichloroethene  | ND | 0.50 |
| cis-1,2-Dichloroethene    | ND | 0.50 |
| Trichlorofluoromethane    | ND | 1.0  |
| m,p-Xylenes               | ND | 0.50 |
| 1,2-Dichlorobenzene       | ND | 0.50 |
| 1,3-Dichlorobenzene       | ND | 0.50 |
| 1,4-Dichlorobenzene       | ND | 0.50 |

HAZARDOUS SUBSTANCES COMPOUNDS:

|                      |    |      |
|----------------------|----|------|
| Acetone              | ND | 10   |
| 2-Butanone           | ND | 1.0  |
| Carbon disulfide     | ND | 0.50 |
| 2-Hexanone           | ND | 1.0  |
| 4-Methyl-2-Pentanone | ND | 1.0  |
| Styrene              | ND | 0.50 |
| Tetrahydrofuran      | ND | 10   |
| Vinyl Acetate        | ND | 5.0  |
| o-Xylene             | ND | 0.50 |

ND: Not Detected

NA: Not Analyzed

HSL compounds are tentative quantitations based on single point calibration.

Report of GC/MS Analysis for  
VOLATILE ORGANICS  
in Water

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Lab Number: K86169  
Sample I.D.: TRAVEL BLANK 8/20/90

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| Compound | Recovery<br>( % ) | QC Limits<br>( % ) |
|----------|-------------------|--------------------|
|----------|-------------------|--------------------|

---

SURROGATE:

|                       |     |        |
|-----------------------|-----|--------|
| 4-Bromofluorobenzene  | 113 | 86-115 |
| 1,2-Dichloroethane-d4 | 95  | 76-114 |
| Toluene-d8            | 97  | 88-110 |

---

ND: Not Detected

NA: Not Analyzed

HSL compounds are tentative quantitations based on single point calibration.

James M. Montgomery  
Consulting Engineers Inc.

# CHAIN OF CUSTODY RECORD

DESTINATION: MONTGOMERY LABORATORIES

OTHER: \_\_\_\_\_



PROJECT/JOB # 226.0380 PROJECT NAME MCAS - EL TORO

SAMPLER(S): (Signature)

Hugh S. L.

Analyses Required

VOA (PP)  
VOA - DUPLICATE  
VOA - SPIKE  
TRAVEL BLANK

| Sample I.D. | Time            | Grab | Comp. | Sample Location | Number/Size of Containers | Remarks  |
|-------------|-----------------|------|-------|-----------------|---------------------------|----------|
| GAC 1       | 8/27/90 8:15 am | X    |       | GAC             | 6 3                       | K86164   |
| GAC 2       | ↓               | ↓    | ↓     |                 | 3 3                       | K86165   |
| GAC 3       | ↓ 8:30 am       | ↓    |       |                 | 6 3                       | K86166   |
|             |                 |      |       | T-BLANK         |                           | K86167   |
|             |                 |      |       |                 |                           | K86168   |
|             |                 |      |       |                 |                           | X K86169 |
|             |                 |      |       |                 |                           |          |
|             |                 |      |       |                 |                           |          |
|             |                 |      |       |                 |                           |          |
|             |                 |      |       |                 |                           |          |
|             |                 |      |       |                 |                           |          |
|             |                 |      |       |                 |                           |          |
|             |                 |      |       |                 |                           |          |
|             |                 |      |       |                 |                           |          |
|             |                 |      |       |                 |                           |          |

| Signature                                 | Print Name             | Company/Title            | Date           | Time           |
|---|------------------------|--------------------------|----------------|----------------|
| Relinquished by: <u>Hugh S. L.</u>        | <u>Hugh Wong</u>       | <u>JMM</u>               | <u>8/27/90</u> | <u>8:30 am</u> |
| Received by: <u>4-SPEED</u>               |                        |                          |                |                |
| Relinquished by:                          |                        |                          |                |                |
| Received by:                              |                        |                          |                |                |
| Relinquished by:                          |                        |                          |                |                |
| Received by (Lab): <u>Gricelda Aceves</u> | <u>Gricelda Aceves</u> | <u>JMMontgomery Labs</u> | <u>8/27/90</u> | <u>2:10</u>    |